

SEQUENCE LISTING

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<120> Insecticidal Proteins From *Bacillus Thuringiensis*

<130> 021565-083

<140> US 09/739,243

<141> 2000-12-19

<150> US 60/173,387

<151> 1999-12-28

<160> 13

<170> PatentIn version 3.0

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<211> 3687

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<221> CDS

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 Asp Pro Leu Glu Val Ser Leu Ser Leu Leu Gln Phe Leu Leu Asn Asn
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 Gly Ala Leu Arg Pro Ser Glu Trp Glu Leu Phe Leu Ala Gln Ile Glu
 65 70 75 80
 Gln Leu Ile Asp Arg Arg Ile Glu Ala Thr Val Arg Ala Lys Ala Ile

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385	390	395	400
Arg Gly Thr Val Asp Ser Leu Val Ser Ile Pro Pro Gln Asp Tyr Ser	405	410	415
Val Pro Pro His Arg Gly Tyr Ser His Leu Leu Ser His Val Thr Met	420	425	430
His Asn Ser Ser Pro Ile Phe His Trp Thr His Arg Ser Ala Thr Pro	435	440	445
Arg Asn Ile Ile Tyr Pro Asp Ser Ile Thr Gln Ile Pro Val Val Lys	450	455	460
Ala Ser His Leu Ser Gly Gly Ser Val Ile Lys Gly Pro Gly His Thr	465	470	475
Gly Gly Asp Leu Ile Ser Leu Pro Val Asn Asn Phe Thr His Phe Arg	485	490	495
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Ala Ala Ala Gly Asp Gly Phe Asn Thr Thr Ser Tyr Arg Ala Thr Met	530	535	540
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Ile Pro Val Asp Ala Thr Phe Glu Ala Gly Tyr Asn Leu Glu Arg Ala	595	600	605
Gln Lys Ala Val Asn Ala Leu Phe Thr Ser Thr Asn Gln Lys Gly Leu	610	615	620
Gln Thr Asp Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val	625	630	635
Asp Cys Leu Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Lys Leu Ser	645	650	655
Glu Lys Val Lys Gln Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu	660	665	670
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Ile Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu 835 840 845		
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Asp Gly Leu Phe Val Asp Ser Gln Tyr Glu Arg Leu Gln Ser Asp Thr 900 905 910		
Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg 915 920 925		
Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala 930 935 940		
Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala Tyr Ser Leu Tyr 945 950 955 960		
Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Ser 965 970 975		
Cys Trp Asn Val Lys Gly His Val Asp Ile Lys Gln Asn Gly His Arg 980 985 990		
Ser Val Leu Val Ile Pro Glu Trp Glu Ala Gln Val Ser Gln Glu Val		

995 1000 1005
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 Pro Asn Ala Val Phe Gln Asn Met His Tyr Lys Asp Tyr Leu Gln Thr
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 Tyr Asp Gly Asp Tyr Thr Gly Ser Phe Ile Asn Pro Asn Leu Ser Ile

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Leu Gly Phe Leu Gly Val Pro Phe Ala Gly Gln Leu Val Thr Phe Tyr			
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Asn Ala Ala Arg Thr Asn Leu Leu Phe Asn Arg Phe Thr Thr Leu Asp			
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Ser Leu Phe Thr Gln Phe Met Pro Ser Phe Gly Thr Gly Pro Gly Ser			
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225	230	235	240
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645 650 655	
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Ala Glu Glu Asp Leu Glu Ala Ala Lys Lys Ala Val Ala Ser Leu Phe	
660 665 670	
aca cgc aca agg gac gga tta caa gta aat gtg aca gat tat caa gtc	2064
Thr Arg Thr Arg Asp Gly Leu Gln Val Asn Val Thr Asp Tyr Gln Val	
675 680 685	
gat caa gcg gca aat tta gtg tca tgc tta tca gat gaa caa tat gcg	2112
Asp Gln Ala Ala Asn Leu Val Ser Cys Leu Ser Asp Glu Gln Tyr Ala	
690 695 700	
cat gat aaa aag atg tta ttg gaa gcg gta cgc gcg gca aaa cgc ctc	2160
His Asp Lys Lys Met Leu Leu Glu Ala Val Arg Ala Ala Lys Arg Leu	
705 710 715 720	
agc cga gaa cgt aac tta ctt cag gat cca gat ttt aat aca atc aat	2208
Ser Arg Glu Arg Asn Leu Leu Gln Asp Pro Asp Phe Asn Thr Ile Asn	
725 730 735	
agt aca gaa gaa aat gga tgg aaa gca agt aac ggc gtt act att agt	2256

Ser Thr Glu Glu Asn Gly Trp Lys Ala Ser Asn Gly Val Thr Ile Ser	
740 745 750	
gag ggc ggt cca ttc tat aaa ggc cgt gca ctt cag cta gca agt gca	2304
Glu Gly Gly Pro Phe Tyr Lys Gly Arg Ala Leu Gln Leu Ala Ser Ala	
755 760 765	
cga gaa aat tac cca aca tac atc tat caa aaa gta gat gca tcg gag	2352
Arg Glu Asn Tyr Pro Thr Tyr Ile Tyr Gln Lys Val Asp Ala Ser Glu	
770 775 780	
tta aaa cct tat aca cga tat aga ctg gat ggg ttc gtg aag agt agt	2400
Leu Lys Pro Tyr Thr Arg Tyr Arg Leu Asp Gly Phe Val Lys Ser Ser	
785 790 795 800	
caa gat tta gaa att gat ctc att cac cat cat aaa gtc cat ctt gtg	2448
Gln Asp Leu Glu Ile Asp Leu Ile His His His Lys Val His Leu Val	
805 810 815	
aaa aat gta cta gat aat tta gta tct gat act tac cca gat gat tct	2496
Lys Asn Val Leu Asp Asn Leu Val Ser Asp Thr Tyr Pro Asp Asp Ser	
820 825 830	
tgt agt gga atc aat cga tgt gag gaa caa cag atg gta aat gcg caa	2544
Cys Ser Gly Ile Asn Arg Cys Glu Glu Gln Gln Met Val Asn Ala Gln	
835 840 845	
ctg gaa aca gaa cat cat cat ccg atg gat tgc tgt gaa gca gct caa	2592
Leu Glu Thr Glu His His His Pro Met Asp Cys Cys Glu Ala Ala Gln	
850 855 860	
aca cat gag ttt tct tcc tat att gat aca ggg gat tta aat tcg act	2640
Thr His Glu Phe Ser Ser Tyr Ile Asp Thr Gly Asp Leu Asn Ser Thr	
865 870 875 880	
gta gac cag gga atc tgg gtg atc ttt aaa gtt cga aca aca gat ggt	2688
Val Asp Gln Gly Ile Trp Val Ile Phe Lys Val Arg Thr Thr Asp Gly	
885 890 895	
tat gcg acg cta gga aat ctt gaa ttg gta gag gtc gga ccg tta ttg	2736
Tyr Ala Thr Leu Gly Asn Leu Glu Leu Val Glu Val Gly Pro Leu Leu	
900 905 910	
ggg gaa cct cta gaa cgt gaa caa aga gaa aat gcg aaa tgg aat gca	2784
Gly Glu Pro Leu Glu Arg Glu Gln Arg Glu Asn Ala Lys Trp Asn Ala	
915 920 925	
gag tta gga aga aaa cgt gca gaa aca gat cgc gtg tat caa gat gcc	2832
Glu Leu Gly Arg Lys Arg Ala Glu Thr Asp Arg Val Tyr Gln Asp Ala	
930 935 940	
aaa caa tcc atc aat cat tta ttt gtg gat tat caa gat caa caa tta	2880
Lys Gln Ser Ile Asn His Leu Phe Val Asp Tyr Gln Asp Gln Gln Leu	
945 950 955 960	
aat cca caa ata ggg atg gca gat att atg gac gct caa aat ctt gtc	2928
Asn Pro Gln Ile Gly Met Ala Asp Ile Met Asp Ala Gln Asn Leu Val	

965	970	975	
gca tca att tca gat gta tat agc gat	gca gta ctg caa atc cct gga		2976
Ala Ser Ile Ser Asp Val Tyr Ser Asp	Ala Val Leu Gln Ile Pro Gly		
980	985	990	
att aac tat gag att tac aca gag ctg tcc aat cgc tta caa caa gca			3024
Ile Asn Tyr Glu Ile Tyr Thr Glu Leu Ser Asn Arg Leu Gln Gln Ala			
995	1000	1005	
tcg tat ctg tat acg tct cga aat gcg gtg caa aat ggg gac ttt aac			3072
Ser Tyr Leu Tyr Thr Ser Arg Asn Ala Val Gln Asn Gly Asp Phe Asn			
1010	1015	1020	
aac ggg cta gat agc tgg aat gca aca gcg ggt gca tcg gta caa cag			3120
Asn Gly Leu Asp Ser Trp Asn Ala Thr Ala Gly Ala Ser Val Gln Gln			
1025	1030	1035	1040
gat ggc aat acg cat ttc tta gtt ctt tct cat tgg gat gca caa gtt			3168
Asp Gly Asn Thr His Phe Leu Val Leu Ser His Trp Asp Ala Gln Val			
1045	1050	1055	
tcc caa caa ttt aga gtg cag ccg aat tgt aaa tat gta tta cgt gta			3216
Ser Gln Gln Phe Arg Val Gln Pro Asn Cys Lys Tyr Val Leu Arg Val			
1060	1065	1070	
aca gca gag aaa gta ggc ggc gga gac gga tac gtg act atc cgg gat			3264
Thr Ala Glu Lys Val Gly Gly Gly Asp Gly Tyr Val Thr Ile Arg Asp			
1075	1080	1085	
ggt gct cat cat aca gaa acg ctt aca ttt aat gca tgt gat tat gat			3312
Gly Ala His His Thr Glu Thr Leu Thr Phe Asn Ala Cys Asp Tyr Asp			
1090	1095	1100	
ata aat ggc acg tac gtg act gat aat acg tat cta aca aaa gaa gtg			3360
Ile Asn Gly Thr Tyr Val Thr Asp Asn Thr Tyr Leu Thr Lys Glu Val			
1105	1110	1115	1120
ata ttc tat tca cat aca gaa cac atg tgg gta gag gta aat gaa aca			3408
Ile Phe Tyr Ser His Thr Glu His Met Trp Val Glu Val Asn Glu Thr			
1125	1130	1135	
gaa ggt gca ttt cat ata gat agt att gaa ttc gtt gaa aca gaa aag			3456
Glu Gly Ala Phe His Ile Asp Ser Ile Glu Phe Val Glu Thr Glu Lys			
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taa			3459

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 <211> 1152
 <212> PRT
 <213> Bacillus thuringiensis

<400> 6
 Met Asn Arg Asn Asn Gln Asn Asp Tyr Glu Val Ile Asp Ala Ser Asn

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Cys Gly Cys	Ala Ser Asp Asp	Val Val Gln Tyr	Pro Leu Ala Arg Asp
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Pro Asn Ala	Val Phe Gln Asn	Met His Tyr Lys	Asp Tyr Leu Gln Thr
35		40	45
Tyr Asp Gly	Asp Tyr Thr Gly	Ser Phe Ile Asn	Pro Asn Leu Ser Ile
50		55	60
Asn Pro Arg	Asp Val Leu Gln	Thr Gly Ile Asn	Ile Val Gly Arg Leu
65		70	75
Leu Gly Phe	Leu Gly Val Pro	Phe Ala Gly Gln	Leu Val Thr Phe Tyr
	85	90	95
Thr Phe Leu	Leu Asn Gln Leu	Trp Pro Thr Asn	Asp Asn Ala Val Trp
	100	105	110
Glu Ala Phe	Met Ala Gln Ile	Glu Glu Leu Ile	Asn Gln Arg Ile Ser
115		120	125
Glu Ala Val	Val Gly Thr Ala	Ala Asp His Leu	Thr Gly Leu His Asp
130		135	140
Asn Tyr Glu	Leu Tyr Val Glu	Ala Leu Glu Glu	Trp Leu Glu Arg Pro
145		150	155
Asn Ala Ala	Arg Thr Asn Leu	Leu Phe Asn Arg	Phe Thr Thr Leu Asp
	165	170	175
Ser Leu Phe	Thr Gln Phe Met	Pro Ser Phe Gly	Thr Gly Pro Gly Ser
	180	185	190
Gln Asn Tyr	Ala Val Pro Leu	Leu Thr Val Tyr	Ala Gln Ala Ala Asn
195		200	205
Leu His Leu	Leu Leu Lys Asp	Ala Glu Ile Tyr	Gly Ala Arg Trp
210		215	220
Gly Leu Asn	Gln Asn Gln Ile	Asn Ser Phe His	Thr Arg Gln Gln Glu
225		230	235
Arg Thr Gln	Tyr Tyr Thr Asn	His Cys Val Thr	Thr Tyr Asn Thr Gly
	245	250	255
Leu Asp Arg	Leu Arg Gly Thr	Asn Thr Glu Ser	Trp Leu Asn Tyr His
	260	265	270
Arg Phe Arg	Arg Glu Met Thr	Leu Met Ala Met	Asp Leu Val Ala Leu
275		280	285
Phe Pro Tyr	Tyr Asn Val Arg	Gln Tyr Pro Asn	Gly Ala Asn Pro Gln
290		295	300
Leu Thr Arg	Glu Ile Tyr Thr	Asp Pro Ile Val	Tyr Asn Pro Pro Ala

305 310 315 320
 Asn Gln Gly Ile Cys Arg Arg Trp Gly Asn Asn Pro Tyr Asn Thr Phe
 325 330 335
 Ser Glu Leu Glu Asn Ala Phe Ile Arg Pro Pro His Leu Phe Asp Arg
 340 345 350
 Leu Asn Arg Leu Thr Ile Ser Arg Asn Arg Tyr Thr Ala Pro Thr Thr
 355 360 365
 Asn Ser Tyr Leu Asp Tyr Trp Ser Gly His Thr Leu Gln Ser Gln Tyr
 370 375 380
 Ala Asn Asn Pro Thr Thr Tyr Glu Thr Ser Tyr Gly Gln Ile Thr Ser
 385 390 395 400
 Asn Thr Arg Leu Phe Asn Thr Thr Asn Gly Ala Asn Ala Ile Asp Ser
 405 410 415
 Arg Ala Arg Asn Phe Gly Asn Leu Tyr Ala Asn Leu Tyr Gly Val Ser
 420 425 430
 Tyr Leu Asn Ile Phe Pro Thr Gly Val Met Ser Glu Ile Thr Ser Ala
 435 440 445
 Pro Asn Thr Cys Trp Gln Asp Leu Thr Thr Thr Glu Glu Leu Pro Leu
 450 455 460
 Val Asn Asn Asn Phe Asn Leu Leu Ser His Val Thr Phe Leu Arg Phe
 465 470 475 480
 Asn Thr Thr Gln Gly Gly Pro Leu Ala Thr Val Gly Phe Val Pro Thr
 485 490 495
 Tyr Val Trp Thr Arg Gln Asp Val Asp Phe Asn Asn Ile Ile Thr Pro
 500 505 510
 Asn Arg Ile Thr Gln Ile Pro Val Val Lys Ala Tyr Glu Leu Ser Ser
 515 520 525
 Gly Ala Thr Val Val Lys Gly Pro Gly Phe Thr Gly Gly Asp Val Ile
 530 535 540
 Arg Arg Thr Asn Thr Gly Gly Phe Gly Ala Ile Arg Val Ser Val Thr
 545 550 555 560
 Gly Pro Leu Thr Gln Arg Tyr Arg Ile Arg Phe Arg Tyr Ala Ser Thr
 565 570 575
 Ile Asp Phe Asp Phe Phe Val Thr Arg Gly Gly Thr Thr Ile Asn Asn
 580 585 590
 Phe Arg Phe Thr Arg Thr Met Asn Arg Gly Gln Glu Ser Arg Tyr Glu
 595 600 605
 Ser Tyr Arg Thr Val Glu Phe Thr Thr Pro Phe Asn Phe Thr Gln Ser

610						615						620					
Gln	Asp	Ile	Ile	Arg	Thr	Ser	Ile	Gln	Gly	Leu	Ser	Gly	Asn	Gly	Glu		
625					630					635					640		
Val	Tyr	Leu	Asp	Arg	Ile	Glu	Ile	Ile	Pro	Val	Asn	Pro	Thr	Arg	Glu		
				645					650					655			
Ala	Glu	Glu	Asp	Leu	Glu	Ala	Ala	Lys	Lys	Ala	Val	Ala	Ser	Leu	Phe		
			660					665					670				
Thr	Arg	Thr	Arg	Asp	Gly	Leu	Gln	Val	Asn	Val	Thr	Asp	Tyr	Gln	Val		
		675					680					685					
Asp	Gln	Ala	Ala	Asn	Leu	Val	Ser	Cys	Leu	Ser	Asp	Glu	Gln	Tyr	Ala		
	690					695					700						
His	Asp	Lys	Lys	Met	Leu	Leu	Glu	Ala	Val	Arg	Ala	Ala	Lys	Arg	Leu		
705					710					715					720		
Ser	Arg	Glu	Arg	Asn	Leu	Leu	Gln	Asp	Pro	Asp	Phe	Asn	Thr	Ile	Asn		
				725					730					735			
Ser	Thr	Glu	Glu	Asn	Gly	Trp	Lys	Ala	Ser	Asn	Gly	Val	Thr	Ile	Ser		
			740					745					750				
Glu	Gly	Gly	Pro	Phe	Tyr	Lys	Gly	Arg	Ala	Leu	Gln	Leu	Ala	Ser	Ala		
		755					760					765					
Arg	Glu	Asn	Tyr	Pro	Thr	Tyr	Ile	Tyr	Gln	Lys	Val	Asp	Ala	Ser	Glu		
	770					775					780						
Leu	Lys	Pro	Tyr	Thr	Arg	Tyr	Arg	Leu	Asp	Gly	Phe	Val	Lys	Ser	Ser		
785					790					795					800		
Gln	Asp	Leu	Glu	Ile	Asp	Leu	Ile	His	His	His	Lys	Val	His	Leu	Val		
				805					810					815			
Lys	Asn	Val	Leu	Asp	Asn	Leu	Val	Ser	Asp	Thr	Tyr	Pro	Asp	Asp	Ser		
			820					825					830				
Cys	Ser	Gly	Ile	Asn	Arg	Cys	Glu	Glu	Gln	Gln	Met	Val	Asn	Ala	Gln		
		835					840					845					
Leu	Glu	Thr	Glu	His	His	His	Pro	Met	Asp	Cys	Cys	Glu	Ala	Ala	Gln		
		850				855					860						
Thr	His	Glu	Phe	Ser	Ser	Tyr	Ile	Asp	Thr	Gly	Asp	Leu	Asn	Ser	Thr		
865					870					875					880		
Val	Asp	Gln	Gly	Ile	Trp	Val	Ile	Phe	Lys	Val							

915					920					925					
Glu	Leu	Gly	Arg	Lys	Arg	Ala	Glu	Thr	Asp	Arg	Val	Tyr	Gln	Asp	Ala
930					935					940					
Lys	Gln	Ser	Ile	Asn	His	Leu	Phe	Val	Asp	Tyr	Gln	Asp	Gln	Gln	Leu
945					950					955					960
Asn	Pro	Gln	Ile	Gly	Met	Ala	Asp	Ile	Met	Asp	Ala	Gln	Asn	Leu	Val
				965					970					975	
Ala	Ser	Ile	Ser	Asp	Val	Tyr	Ser	Asp	Ala	Val	Leu	Gln	Ile	Pro	Gly
			980					985					990		
Ile	Asn	Tyr	Glu	Ile	Tyr	Thr	Glu	Leu	Ser	Asn	Arg	Leu	Gln	Gln	Ala
		995					1000					1005			
Ser	Tyr	Leu	Tyr	Thr	Ser	Arg	Asn	Ala	Val	Gln	Asn	Gly	Asp	Phe	Asn
	1010					1015					1020				
Asn	Gly	Leu	Asp	Ser	Trp	Asn	Ala	Thr	Ala	Gly	Ala	Ser	Val	Gln	Gln
1025					1030					1035				1040	
Asp	Gly	Asn	Thr	His	Phe	Leu	Val	Leu	Ser	His	Trp	Asp	Ala	Gln	Val
			1045					1050					1055		
Ser	Gln	Gln	Phe	Arg	Val	Gln	Pro	Asn	Cys	Lys	Tyr	Val	Leu	Arg	Val
		1060					1065					1070			
Thr	Ala	Glu	Lys	Val	Gly	Gly	Gly	Asp	Gly	Tyr	Val	Thr	Ile	Arg	Asp
	1075					1080						1085			
Gly	Ala	His	His	Thr	Glu	Thr	Leu	Thr	Phe	Asn	Ala	Cys	Asp	Tyr	Asp
	1090					1095					1100				
Ile	Asn	Gly	Thr	Tyr	Val	Thr	Asp	Asn	Thr	Tyr	Leu	Thr	Lys	Glu	Val
1105					1110					1115				1120	
Ile	Phe	Tyr	Ser	His	Thr	Glu	His	Met	Trp	Val	Glu	Val	Asn	Glu	Thr
			1125					1130					1135		
Glu	Gly	Ala	Phe	His	Ile	Asp	Ser	Ile	Glu	Phe	Val	Glu	Thr	Glu	Lys
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 <212> DNA
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<220>
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 cry1B.fw

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20

<210> 8
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<220>
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<210> 9
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<220>
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gcagctaata ctaccacatc 20

<210> 11
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<223> Description of Artificial Sequence: primer 9FW

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<223> Description of Artificial Sequence: primer 9RV

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